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ABSTRACT

This document discusses the process of implementation of the Resource Requirements Prediction Model (RRPM) for institutional planning and budgeting purposes and the incorporation of indirect cost analysis capabilities in order to produce historical full cost results. Description of the model as a specific tool for specific purposes is presented in relation to: balance of implementation effects, RRPM implementation steps, RRPM historical input college IWLM (Instructional Work Load Matrix), ICLM/IWLM applications, the foundation of the RRPM model, historical data requirements, faculty data generator, compatible implementation mode, and uses of RRPM reports. (MJM)

A Blueprint for RRPM 1.6 Application

National Center for
Higher Education Management Systems
at WICHE

National Center for Higher Education Management Systems at WICHE

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- facilitate exchange of comparable data among institutions.
- facilitate reporting of comparable information at the state and national levels.

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A BLUEPRINT FOR RRPM 1.6 APPLICATION

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This edition of A Blueprint for RRPM 1.6 Application supersedes all previous drafts of the same title.

ABSTRACT

This document discusses the process of implementation of the Resource Requirements Prediction Model (RRPM) 1.6 for institutional planning and budgeting purposes and the incorporation of indirect cost analysis capabilities in order to produce historical full cost results.

The starting point for implementation of RRPM is the Induced Course Load Matrix (ICLM), which describes the relationship between disciplines or departments and students in degree programs. Computer programs that construct the ICLM from institutional files are available from NCHEMS. Additional RRPM data requirements center around faculty-related information. NCHEMS has developed a computer program series called the Faculty Data Generator, which produces required faculty data from institutional files.

In addition to its utility as a historical model, RRPM can be used for interinstitutional historical cost comparison and exchange. If compatible exchange is desired, each participating institution must adhere to strictly defined procedures and definitions. These include definition of primary and support cost centers, definition of what comprises direct and indirect costs, definition of an FTE student, and definition of allocation techniques. Given agreement on these matters, RRPM will produce compatible unit costs by level of instruction, level of student, and field of study.

Whether RRPM is used by an institution for its own purposes or for purposes of exchange and comparison, its ultimate utility is as an aid in planning. While the planning model cannot answer judgmental or value-laden questions, its judicious use can clarify the nature of many thorny decision-making problems--RRPM can help planners and administrators ask more pointed questions and get more useful answers.

After having accomplished implementation of RRPM as a direct cost model, the institution may wish to develop a full unit costing capability. This can be achieved by feeding the results of Cost Finding Principles indirect cost analysis into RRPM, which will then calculate full unit costs.

INTRODUCTION

In December, 1972, the NCHEMS Technical Council released the Resource Requirements Prediction Model, version 1.6, for general distribution to institutions throughout the country. RRPM 1.6 is intended to supersede all previous NCHEMS cost simulation models (the Cost Estimation Model and RRPM 1.3), since it provides both greater capability and greater user convenience than the earlier versions. Now that the difficult technical task of developing and programming a truly usable cost simulation model has been accomplished, the focus must shift to questions related to implementation of the model in the institutional planning process.

This document is intended to address the problems of initial implementation and use of RRPM 1.6 for institutional planning and budgeting purposes. Although the model has a great deal of flexibility and some rather sophisticated capabilities, the purpose here is to define a straightforward approach to implementation that will produce significant rewards for institutional planners with a minimum amount of effort and cost. After using the model in its simplest form, campuses will be familiar enough with all of its facets to consider how it can be molded more effectively to meet unique institutional needs. Thus, this document is for those wishing to get started without delay in implementing an instructional cost simulation model. It might be thought of as an implementation primer for RRPM 1.6 that outlines a step-by-step list of specific implementation tasks.

This publication should be read by all institutional personnel, both technical and administrative, who will play a role in implementing the model or using it for planning purposes. The document is not a technical description of the model design or its internal mechanisms. Rather, it describes its application as a specific tool for specific purposes.

HIERARCHY OF INFORMATION SYSTEMS*

3 PLANNING AND MANAGEMENT SYSTEMS

<u>FORECAST REPORTS</u>

- GOALS AND PRIORITIES
- PROGRAM ENROLLMENT PREDICTIONS
- PROGRAM & ORGANIZATIONAL UNIT BUDGETS
- PERSONNEL REQUIREMENTS

2 MANAGEMENT INFORMATION SYSTEMS

<u>ANALYTIC REPORTS</u>

- COST ANALYSIS (E.G., UNIT COSTS)
- FACULTY WORKLOAD ANALYSIS
- STUDENT DEMAND ANALYSIS
- EDUCATIONAL OUTCOMES ANALYSIS

1 INFORMATION SYSTEMS

<u>OPERATING REPORTS</u>

- BUDGET AND EXPENDITURES
- STUDENT REGISTRATIONS
- COURSE MASTER INDEX
- PAYROLL AND PERSONNEL
- GRADE REPORTS
- INVENTORIES

*SHEEHAN, BERNARD S., <u>REPORT ONE - WESTERN CANADIAN UNIVERSITIES TASK FORCE ON INFORMATION NEEDS AND SYSTEMS</u>, UNIVERSITY OF CALGARY, ALBERTA, CANADA, NOVEMBER, 1972.

HIERARCHY OF INFORMATION SYSTEMS

Educational information systems can be thought of in three hierarchical levels. Every institution must have the lowest level of information systems in order to operate on a daily basis. First-level information systems provide the control and operating reports that are necessary for the daily execution of institutional business. Such reports include budget and accounting information, student registration records, payroll and personnel information, grade reports, etc. In many institutions these operational information systems are automated.

A second level of information systems is frequently called management information systems (MIS). This second tier of information systems allows the institution to link certain data elements from the first-level information systems to produce a series of analytic reports. These analytic reports can display a great deal of historical information about utilization of resources, interrelationships among organizational units, and a variety of measures related to the current operation of the institution. Through examination of the analytic reports, administrators gain an improved understanding of their institution and are better prepared for approaching decision making with regard to future program planning and budgeting.

The third and highest level of information systems is known as planning and management systems (PMS). These systems offer assistance during the process of devising future budgets and determining how resources will be allocated

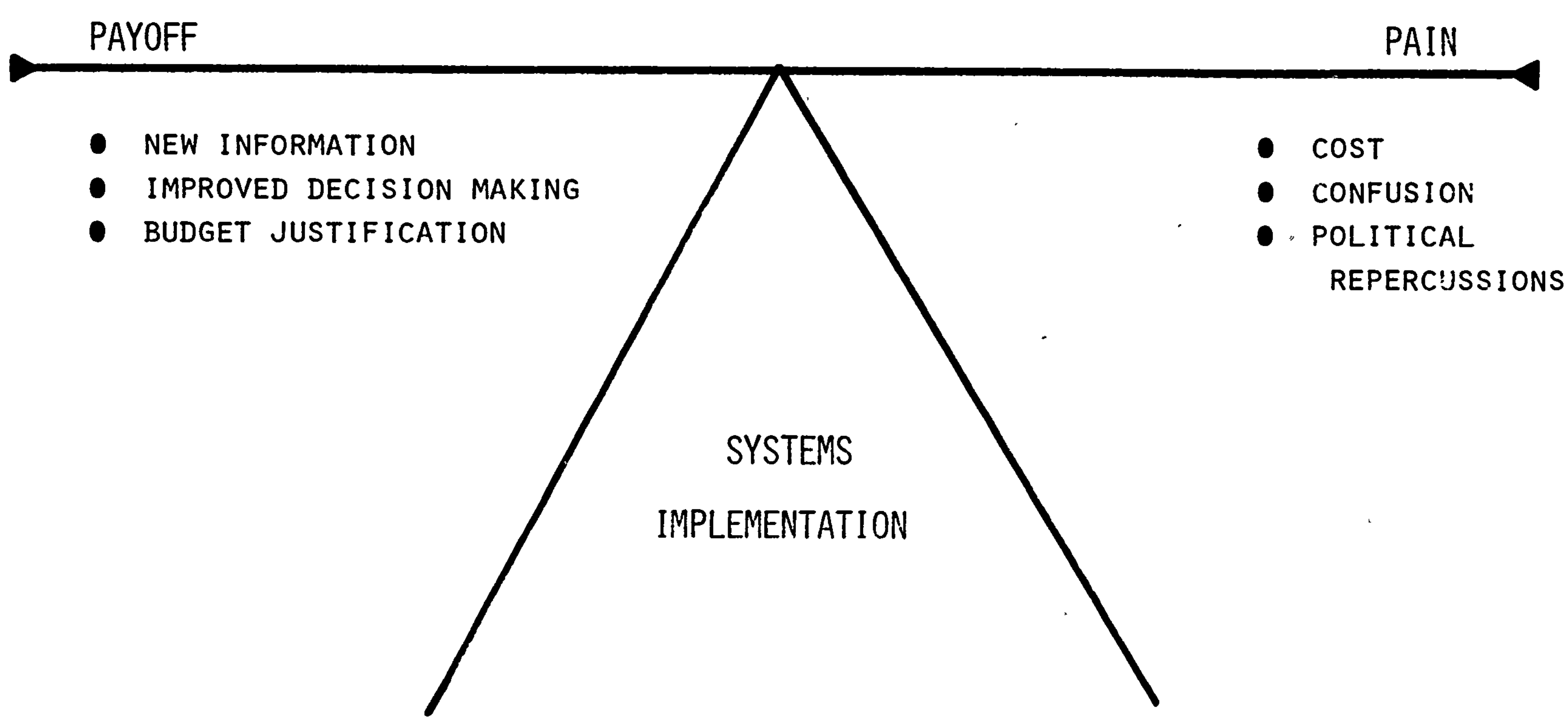
internally in order to allow the institution to pursue its goals and objectives efficiently. The major difference between the second level of management information systems and the third level of planning and management systems is that the second-level systems are driven by historical data and display reports related to the status quo, while the third-level systems offer the user an opportunity to alter the historical inputs on the basis of policy decisions and thus forecast the resource requirements that will be a consequence of those decisions. By inputting several alternative sets of policy decisions for internal resource allocation, campus planners may receive from the palnning and management systems a series of forecast reports that display projected enrollment distributions, organizational unit budgets, program budgets, and personnel requirements stemming from each alternative set of policy decisions.

In many cases, the same computer systems may be used for both the second-level management information systems and the third-level planning and management systems applications. Only the input data change, viz., historical data versus modified future data. It is largely a technical problem to implement a management tool such as the Resource Requirements Prediction Model for a second-level MIS application. This kind of application requires that technical accuracy and precision be used in collecting and manipulating the historical input data and that predetermined conventions for operation of the model be adhered to.

It is much more difficult to use the model for the third-level PMS applications. Before proceeding, one must apply a great deal of thought and judgment

to the task of evaluating the current state of affairs in the institution and devising alternative approaches for future operation. Technical implementation of RRPM 1.6 for a level-two analytic application requires no hard decisions from administrators. However, in seeking to use the model as a level-three planning and budgeting tool, administrators are faced with a series of specific decisions about their future mode of operation that may, in fact, be made more difficult by the fact that they have more information available in the form of accurate predictions of the resource implications of various alternative operating assumptions.

<u>BALANCE OF IMPLEMENTATION EFFECTS</u>



BALANCE OF IMPLEMENTATION EFFECTS

In considering the implementation of a tool such as the RRPM system, educators will automatically evaluate the balance that is likely to occur between the payoff and benefits they reap and the pain they must endure in order to make the implementation successful. Payoffs to institutional administrators come as new forms of new information, improved decision making, and better budget justification. On the other hand, all implementation efforts incur some costs as well as a certain amount of confusion and the potential for political repercussions, both internal and external. Obviously, if in weighing these pros and cons of implementation the educator perceives that the painful aspects of the undertaking outweigh the benefits, he will elect not to adopt the innovative practices and tools. The responsibility of the NCHEMS Applications and Implementation staff is to define the implementation task for institutional personnel so clearly that the cost and confusion will be kept to an absolute minimum while the benefits will be maximized in the shortest possible time. The political repercussions and human relations problems which may be stirred within the institution as a result of doing things in a new way can be assessed only by those who know the individual campus very well. By reading this document, those who are considering RRPM implementation may be able to evaluate better the relative desirability of implementing the RRPM system at their college or university.

RRPM 1.6 IMPLEMENTATION STEPS

1.	DEVELOP AN ICLM	TECHNICAL TASK
2.	GATHER HISTORICAL RRPM INPUTS ● CONSIDER USING STANDARD CONVENTIONS TO FACILITATE INFORMATION EXCHANGE	TECHNICAL TASK
3.	PRODUCE HISTORICAL RRPM REPORTS	TECHNICAL TASK
4.	EVALUATE THE STATUS QUO	COOPERATIVE JUDGMENTAL TASK
5.	DEVELOP ALTERNATIVE SETS OF PLANNING DECISIONS	COOPERATIVE JUDGMENTAL TASK
6.	MAKE RRPM PROJECTION RUNS	TECHNICAL TASK
7.	EVALUATE ALTERNATIVE PROPOSALS	COOPERATIVE JUDGMENTAL TASK
8.	SELECT BEST ALTERNATIVES AND IMPLEMENT	COOPERATIVE JUDGMENTAL TASK

RRPM IMPLEMENTATION STEPS

The first step in implementing RRPM is the development of a historical Induced Course Load Matrix (ICLM). This can be accomplished through use of a computer system developed by NCHEMS called the ICLM Generator. Development of the institution's own ICLM, which defines the relationship between various types of students and the disciplines from which they draw resources, is a purely technical task. The ICLM provides useful level two management information even outside the context of RRPM.

The second step is the gathering of historical operating parameter data, such as faculty workloads, distribution of faculty ranks, faculty salary schedules, etc. At this point the institution must consider whether the data from the historical runs of the model will be used only to support the institutional planning and budgeting process or whether they will be used to report to funding sources or be exchanged with other schools as well. If the model is to be used for institutional planning only, any desired set of definitions may be employed. On the other hand, if reporting or exchange is desirable, a standard set of conventions and definitions must be used in developing historical input data, in order to insure compatability. Such conventions and definitions are being developed at NCHEMS.

After all historical input data have been collected, the third step involves running the RRPM system with historical input data in order to generate reports which accurately reflect the current operation.

The fourth step is evaluation of the status quo as reflected in the historical reports, asking if the current institutional mode of operation is consistent with institutional policies and objectives.

The fifth step of the implementation process involves the difficult task of developing alternative sets of specific planning decisions, using the status quo reports as the point of departure. Many individuals, including faculty, students, lay boards, and administrators, may be part of the team that develops alternative plans. The technician must be available to the decision makers to translate their decisions into the required RRPM input data formats and to carry out the sixth step: making the RRPM projection runs for each alternative set of planning decisions.

The seventh step is evaluation, by the planning team, of the political and operational implications of projected results of the specific planning decisions. As a result of this process, some of the alternatives may be considered more feasible and acceptable than others.

The eighth step is selection and implementation of the best alternatives. No RRPM run should be considered the final word cast in bronze. The selected alternative decisions should be continuously reevaluated in order to make any necessary midcourse corrections.

One additional step, which will be discussed later, involves the coupling of the Cost Finding Principles system (CFP) with the RRPM system to gain a full costing capability within the institution. Only by first using the RRPM system and then carefully examining and using the Cost Finding Principles system will institutional personnel gain sufficient understanding of the interrelationships between support activities and primary activities to use the two systems together to determine the full cost of primary programs. Additional training and implementation documents will be developed by NCHEMS to delineate more completely the interrelationships between the CFP and RRPM systems.

Each of the eight steps described above has been designated as either a technical or a cooperative judgmental task. The technical tasks are the more easily completed by far. Experience has shown that implementation in a purely technical sense on a typical campus is relatively easy, but it becomes more difficult when steps requiring cooperative judgment and subjective input are contemplated. As always, it is far easier to discover the past than to come to grips with the realities of making difficult choices about the future. The implementation process must protect administrators from the feeling that the mere articulation of a set of priorities or planning decisions tips their hands or erodes their flexibility in dealing with various components of the planning team. Educators must become accustomed to continually looking at many alternatives, so that those who must reach decisions will have the widest possible set of known choices.

ICLM GENERATOR

INPUT DATA REQUIREMENTS

LINKED DATA ELEMENTS

STUDENT ID	STUDENT MAJOR	STUDENT LEVEL	COURSE ID • DISCIPLINE • LEVEL	CREDIT HOURS

RRPM HISTORICAL INPUT DATA

ICLM GENERATOR

The Induced Course Load Matrix Generator is a software package that may be obtained from NCHEMS. It operates on a 32K byte computer and is an important technical tool in its own right, as well as a producer of input data for the RRPM system. The ICLM Generator requires input from the student registration system of the institution in order to construct a multidimensional matrix that displays the number of units (credit hours) that students in various degree or certificate programs take in each of the disciplines or departments of the institution. This display is known as an Induced Course Load Matrix (ICLM).

In order to operate the ICLM Generator, five data elements must be linked to form a record for each student enrolled in each course section in the institution during a particular semester or academic year. The five data elements are (1) a student identifier, probably social security number; (2) the student's designated major; for example, history, biology, English, or undeclared; (3) the student's level: lower division, upper division, master's, doctoral; (4) the identifier for the specific course to which the student is being linked, e.g., H101, which would indicate History 101 (it is assumed that the course identifier would indicate both the discipline and the level of the course); and (5) the credit-hour value of the course.

A historical ICLM can be generated for any specified period of time. Such a time frame might be one semester, one quarter, or an entire academic year. For that matter, several academic years may be rolled into one averaged ICLM. For initial implementation of RRPM, the development of an ICLM that represents one year seems most appropriate.

CASPER COMMUNITY COLLEGE ICLM - 1971-72

Casper, Wyoming

Programs and FTE Enrollments
(Aggregated)

PROGRAMS

DISCIPLINES	Undeclared	Business	Liberal Arts	Agriculture	Biological Science	Health Sciences	Science/ Math	Social Sciences	Building Technologies	Industrial Technologies
FTE Enrollments	[illegible]	142	128	55	19	107	66	164	24	66
Business	13.4	17.7	1.5	.6		.4	.7	3.2		.5
Language-Lit.	4.4	5.5	10.0	5.7	7.3	4.1	6.1	7.3		2.2
Fine Arts	4.7	1.1	9.0	.1	.7	.6	1.3	1.4		.3
Life Sciences	3.1	2.0	3.7	19.4	12.0	13.9	1.4	7.2		.8
Physical Sciences	4.2	6.5	6.1	9.1	10.4	7.9	24.3	4.9		2.4
Social-Behavioral Sciences	3.8	4.2	6.6	1.8	6.2	3.1	2.8	12.9		1.6
Vocational Tech.	3.4	.02	.1	.3	.4	7.0	.4	.1	37.0	29.2

COMMUNITY COLLEGE ICLM DISPLAY

It is very important that readers of this document fully understand the difference between programs (columns of the ICLM) and disciplines of the ICLM. Columns of the ICLM may contain students classified according to some degree objective, non-degree objective, curricular path or any other hemogeneous grouping. Rows of the ICLM on the other hand are the disciplines or departments which provide instructional services to students in the programs. RRPM is concerned with projecting costs of both columns and rows (programs and disciplines).

The ICLM presented on the opposite page is from Casper Community College in Casper, Wyoming, and has been reprinted by permission. It is only two-dimensional because Casper Community College considers itself to have only lower division students and lower division instruction. If miltiple levels of instruction and students were included, as would be most typical of baccalaureate and graduate institutions, the matrix would be four-dimensional.

The ICLM provides valuable information and is a useful tool in its own right. Its value stems from the fact that it depicts the relationship between various types of students and the instructional disciplines. We would anticipate that each of the 142 students who are classified as business students would induce a heavy load on the business discipline (17.7 credit hours). However, the load induced by the average business student on the physical science discipline (6.5 credit hours) and the social and behavioral sciences discipline (4.2 credit hours) may not be so easily anticipated.

CASPER COMMUNITY COLLEGE IWLM - 1971-72

Casper, Wyoming

Programs and FTE Enrollments
(Aggregated)

PROGRAMS

DISCIPLINES	Undeclared	Business	Liberal Arts	Agriculture	Biological Science	Health Sciences	Science/ Math	Social Sciences	Building Technologies	Industrial Technologies	TOTAL
FTE Enrollments	60	142	128	55	19	107	66	164	24	66	
Business	803	2,514	185	33		38	44	527		35	4,17[illegible]
Language-Lit.	261	784	1,287	314	139	442	405	1,206		146	4,984
Fine Arts	276	149	1,153	8	14	63	84	230		20	1,997
Life Sciences	184	273	472	1,067	227	1,492	93	1,174		53	5,035
Physical Sciences	249	923	786	505	198	847	1,608	805		161	6,082
Social-Behavioral Sciences	228	595	841	99	118	331	189	2,116		104	4,621
Vocational Tech.	203	3	12	22	7	756	31	8	870	1,927	3,839

Total Credit Hours
30,737

COMMUNITY COLLEGE IWLM DISPLAY

Whereas the Induced Course Load Matrix displays the number of units taken in each discipline by the average student enrolled in each program, the Instructional Work Load Matrix displays the total number of units each discipline must generate in order to satisfy the demand placed on it by all students enrolled in each program. The number in any given cell of the IWLM is determined by multiplying the same cell of the ICLM by the number of students in that program. For example, the average business student, of which there are 142, takes 6.5 credit hours in physical sciences courses. Consequently, the physical sciences discipline will have to generate 6.5 X 142 or 923 credit hours to satisfy the demand of all 142 FTE business majors. The physical sciences discipline will have to generate 6,082 credit hours to satisfy the demand placed on it by all types of students.

ICLM/IWLM APPLICATIONS

1 AGGREGATED VERSION

- GLOBAL VIEW OF THE INSTRUCTIONAL FUNCTION
- LONG-RANGE PROJECTIONS

2. DETAILED VERSION

- SPECIFIC COLUMN AND ROW REPORTS FOR DEANS AND CHAIRMEN
- STRUCTURE FOR PRESCRIBING CURRICULUM REQUIREMENTS
- SHORT-RANGE PLANNING AND BUDGETING

ICLM/IWLM APPLICATIONS

As previously stated, the Induced Course Load Matrix and Instructional Work Load Matrix have specific utility in their own right, even if an institution does not begin RRPM implementation. It is likely that administrators will require that more than one version of the ICLM/IWLM be developed for different purposes at different levels within the institution. A highly aggregated version of these matrices provides a global view of the institution's instructional function, as well as a basis for long-range forecasting and planning. On the other hand, detailed versions of the ICLM/IWLM provide the kind of specific column and row reports that deans and department chairmen will wish to have. The detailed versions also provide a structure for those who plan curriculum requirements and consider prescribing changes in the required courses for various types of majors. Detailed versions are most appropriate for short-range planning and budgeting and for investigation of alternative plans for internal resource allocation.

ICLM/IWLM IS THE FOUNDATION FOR RRPM 1.6

	PROGRAM	PROGRAM	PROGRAM	PROGRAM	
DISCIPLINE COSTS	872 CREDIT HOURS $	217 CREDIT HOURS $	109 CREDIT HOURS $	301 CREDIT HOURS $	DISCIPLINE COST AND UNIT COST
DISCIPLINE COSTS	428 $	623 $	731 $	121 $	
DISCIPLINE COSTS	693 $	972 $	605 $	43 $	
DISCIPLINE COSTS	126 $	526 $	241 $	982 $	
	PROGRAM COST & COST PER MAJOR				TOTAL INSTRUCTIONAL COST

THE FOUNDATION OF THE RRPM MODEL

The ICLM/IWLM concept is the foundation of RRPM. The model accepts the ICLM as a direct input and multiplies enrollments through the ICLM to produce an IWLM. Each row of the ICLM represents a specific instructional discipline or department and defines the number of credit hours that the discipline must generate in order to satisfy the demands of student majors in each of the programs of the institution. Operating parameters, such as faculty workloads, salary schedules, and expenses, are input to the model for each of the discipline rows of the IWLM. With this description of how each discipline will be operated and the number of students in each program, the model proceeds to calculate the dollars and faculty that each discipline will require. The cost of operating each discipline is distributed to each of the programs in proportion to the number of credit hours each program will draw from the discipline. Thus, the total cost of each discipline is distributed across the cells of its IWLM row. By dividing the total cost of each discipline by the total number of credit hours it produces, a unit cost (cost per credit hour) is calculated.

After all of the individual discipline costs have been calculated and distributed to the various programs in proportion to credit hours consumed, the total cost of each program is calculated by summing down the various columns of the matrix. The total cost of the program is then divided by the number of majors to provide a unit cost (cost per major).

This brief description of the RRPM mechanism is oversimplified, but it is essentially correct. The model is no more than a straightforward computational tool, which neither interprets user intent nor tolerates user mistakes in inputting data. Simulation models have limitations, and it is important that the user understand the limitations as well as the capabilities of such tools. A model will do only what it is told to do. Given a set of input that is free from data errors, the model will provide an accurate response to a "what if" question, e.g., what will be the impact of an 8 percent increase in lower-division students next year? If the "what if" question is inappropriate or unrealistic, the model's answer will likewise be unrealistic. Once the model user understands the tool and its design, he or she still faces the problem of devising the right questions to investigate with this new modeling capability.

RRPM 1.6 HISTORICAL DATA REQUIREMENTS

1. ICLM AND PROGRAM ENROLLMENTS
   - PREPARED BY ICLM GENERATOR
2. TEACHING-FACULTY DATA PER DISCIPLINE LEVEL
   - PRODUCTIVITY RATIO*
   - FACULTY RANK MIX*
3. FACULTY DATA PER DISCIPLINE
   - CHAIRMAN ASSIGNMENTS
   - SALARY SCHEDULE*
4. NONTEACHING STAFF DATA PER DISCIPLINE
   - RATIOS OF SUPPORT STAFF TO FACULTY
   - WAGE SCHEDULES
5. OTHER DIRECT COST LINE ITEMS PER DISCIPLINE
   - LINEAR EQUATIONS OR CONSTANTS
6. NONINSTRUCTIONAL COST CENTER DATA
   - LINEAR EQUATIONS OR CONSTANTS

*PREPARED BY FACULTY DATA GENERATOR

HISTORICAL DATA REQUIREMENTS

Initial implementation of RRPM 1.6 requires collection of a wide variety of historical input data. These data may be classified into six categories. The first category of historical RRPM inputs is produced by the ICLM Generator and prepared automatically for input to the model. These inputs include the student enrollments, either FTE or headcount, for each instructional program and the number of credit hours associated with each cell of the ICLM. Without the use of the ICLM Generator or some similar computer system, this input would become a staggering requirement. With the use of the ICLM Generator, it becomes a routine operation for most institutions.

The second category of historical input data is related to teaching faculty and must be generated for each discipline at each instructional level. This input includes the faculty productivity ratio, which is the number of student credit hours generated by the average FTE faculty member teaching at each level of each discipline. For example, this number is derived for lower-division economics by dividing the historical row total of the Induced Work Load Matrix for lower-division economics by the number of historical FTE faculty in lower-division economics. It is also necessary to determine the faculty rank mix (professors, associates, assistants, etc.) of the set of FTE faculty instructing in lower-division economics. In order to gather these faculty data inputs, most institutions must conduct some sort of faculty assignment or activity analysis. The collection of these faculty data inputs through such an analysis is usually the most difficult portion of the RRPM

historical data collection process. NCHEMS has developed a software package called the Faculty Data Generator that will assist institutions in deriving and preparing these faculty data inputs for the RRPM system.

A third category of historical input data includes certain faculty-related information that must be input only at the discipline level (not at the instruction level within each discipline as in the previous faculty data category). These faculty data per discipline include a description of the chairman's assignment, if any, and a salary schedule for teaching faculty within the discipline. The salary schedule will be applied uniformly to all teaching faculty within the discipline regardless of the instruction level at which they teach.

The fourth category of historical input includes data related to nonteaching staff, which must be input for each discipline. These data include ratios of support staff to faculty as well as support staff wage schedules. For example, it might be determined that in the biology department there is one secretary for every seven FTE instructional faculty and that the average secretary receives annual wages in the amount of $6,000.

The fifth category of inputs includes linear estimating equations for each of the additional line items in the budget for each discipline or department. For example, it might be determined that for the history department $10 has been budgeted for instructional supplies for every credit hour produced, $250 has been budgeted for travel for every full-time faculty member, etc.

If it proves difficult for institutional personnel to develop such estimating equations for departmental line-item expenses, a total number of expenditure dollars (constant) may be input to the model. However, the input of expenditure totals for departmental line-item expenses will not provide the capability of forecasting future expenses through use of the model.

The sixth and final category of RRPM inputs involves the noninstructional expenses for the various activities within the institution. If the library is considered a separate cost center in the accounting system, the institution will wish to enter either a linear equation or constant that will allow the model to calculate and report the total library expenditures along with all instructional costs. Similar inputs for noninstructional cost centers in the area of research, public service, student services, executive management, physical plant maintenance, etc. must also be made. Most institutions that have had experience with RRPM have found it difficult to define suitable linear estimating equations and consequently have inserted total numbers of expended dollars as constants for this sixth category of inputs.

In general, it can be stated that the inputs for RRPM are readily available in most institutions through the first-level information systems used for routine daily operation. If important data elements are simply not available, the institution will be unable to implement the RRPM system. However, given the availability of the required data elements, implementation of the model with historical inputs can be accomplished by knowledgeable personnel in most institutions in a few weeks.

FACULTY DATA GENERATOR

INPUT DATA REQUIREMENTS

LINKED DATA ELEMENTS

FACULTY I. D.	RANK	SALARY RATE	FTE IN INSTRUCTION	DISCIPLINE	COURSE LEVEL	COURSE CONTACT HOURS

FACULTY DATA GENERATOR

Some special attention should be given to the most difficult input requirement of the RRPM system, namely, the derivation of faculty assignment data. As previously mentioned, a Type II software package referred to as the Faculty Data Generator, which offers significant assistance in this area, has been prepared by NCHEMS. To employ the Faculty Data Generator for preparation of RRPM 1.6 inputs, institutional personnel must construct a record of seven linked data elements for each faculty teaching assignment to a specific course. Then, a long series of these records becomes the input to the software, which in turn produces RRPM inputs related to faculty work loads, rank mix, and salary schedules for each discipline. The seven data elements contained in each record include (1) a unique identifier (usually social security number) for the faculty member; (2) the faculty member's rank; (3) his or her salary rate; (4) the percentage of the faculty member's total assignment dedicated to instruction; (5) an identifier for the department or discipline offering the specific course to which the record is related; (6) the instruction level of the course; and (7) the number of course contact hours.

Like the ICLM Generator, the Faculty Data Generator is a useful analytic tool in its own right and produces a number of useful reports in addition to assisting with the RRPM implementation process.

COMPATIBLE IMPLEMENTATION MODE
REQUIRES IEP CONVENTIONS

1. DEFINITION OF PRIMARY AND SUPPORT COST CENTERS

2. DEFINITION OF DIRECT COSTS

3. DEFINITION OF AN FTE STUDENT

4. DEFINITION OF ALLOCATION METHODS

5. SUFFICIENT AUGMENTING PROFILE INFORMATION
   - (A) TYPE OF INSTITUTION
   - (B) EXPLAIN COST DIFFERENCES AMONG SIMILAR TYPES
     1. SALARY SCHEDULE
     2. RANK MIX

COMPATIBLE IMPLEMENTATION MODE

In some instances, institutions will wish to implement the RRPM system in a compatible or standard mode so that the output of the historical runs may be compared and exchanged. If compatible implementation is desired, a great deal of attention must be given during the initial collection of historical data to the definition of standard conventions and definitions. Each institution participating in compatible implementation of RRPM or other NCHEMS systems must adhere to predefined procedures and definitions, or the resulting output reports will be misleading when interinstitutional comparisons are made. NCHEMS is deeply involved in the development of such standard conventions and definitions through its Information Exchange Procedures project (IEP). The IEP project recommendations are being developed with participation and review of a wide variety of institutional representatives and are intended to provide a common language for institutional data exchange and reporting purposes.

Among the considerations that come into focus when considering compatibility of data are such matters as (1) definition of primary and support cost centers, so that expenditures may be sorted and aggregated on the basis of a standard structure; (2) definition of what specific expenditures comprise direct costs; (3) definition of an FTE student, so that enrollments may be compared and such unit measures as annual cost per major may be developed on a standard basis; and (4) definition of methods for allocating various types of expenses across various cost centers.

In addition, sufficient augmenting profile information must be included to allow involved parties to readily explain the factors behind cost differences among various institutions. This profile information is of two types. One kind of profile information required is that which describes the type of institution. This kind of information would include such descriptions as program mix, primary sources of support, student mix, and so forth. A second kind of profile information required is that which explains cost differences among institutions of similar types. Included here would be such information as salary schedules of faculty and staff, faculty rank mix, and average workload.

This brief description of concerns related to information exchange and compatible implementation of RRPM and other costing systems provides only a surface view of the problems involved in defining standard procedures. The NCHEMS Information Exchange Procedures Task Force is charged with the responsibility of conducting a thorough investigation prior to making recommendations concerning standard cost study conventions and definitions. NCHEMS has a continuing responsibility to educate users of compatible data about potential uses and misuses.

USES OF RRPM REPORTS

DISCIPLINE REPORTS

RRPM currently produces two types of reports, organizational unit reports and a program budget report. The organizational unit reports display the personnel and dollar resources for each discipline. The discipline reports can then be collapsed into department, school/college, and institution-wide reports. Initially, two specific sets of numbers will provide the most meaningful starting point for evaluation of the historical utilization of institutional resources in the various departments or disciplines. These two numbers are the unit cost (usually cost per credit hour) for each instruction level within each discipline and the number of units (credit hours) produced at each instruction or course level. The discipline report displayed on the next page was generated on the State University of New York, Plattsburgh campus. It displays 1971-72 direct costs for the mathematics discipline at lower-division, upper-division, and graduate course levels. Data suggested for initial examination are enclosed within the two rectangles.

Even a quick examination of these figures across all of the departments or disciplines of the institution will reveal a great deal to those responsible for academic planning and resource allocation. The unit cost figures provide a common denominator for comparing the relative resource consumption of each discipline. Of course, one would not expect all disciplines to have equivalent unit costs. Chemistry instruction usually costs far more per credit hour than

ITEP = (01) TEST RUN - SHORT

BASE = (**)

PLATTSBURGH

RESOURCE REQUIREMENTS PREDICTION MODEL

10/23/72

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ORGANIZATIONAL BUDGET

(0031) MATH — DISCIPLINE

(0014) MATH — DEPARTMENT

(0003) SCIENCE AND MATH — SCHOOL/COLLEGE

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN						
FACULTY (BY RANK)						
(PR) PROFESSOR	20,465	1.53	11.93	31,318	14.09	.6236
(AC) ASSOC PROFESSOR	16,008	.99	7.72	15,848	7.13	.3155
(AT) ASST PROFESSOR	13,030	10.30	80.34	134,209	60.37	2.6722
(**) FACULTY TOTALS	14,148	12.82	100.00	181,375	81.59	3.6114
STAFF (BY CATEGORY)						
(SS) SUPPORT STAFF	11,163	1.91	100.00	21,322	9.59	.4245
(**) STAFF TOTALS	11,163	1.91	100.00	21,322	9.59	.4245
EXPENSES (BY TYPE)						
(SP) SUPPLIES				273	.12	.0054
(TE) TELEPHONE				41	.02	.0008
(AV) AUTOMOTIVE				30	.01	.0006
(**) EXPENSE TOTALS				344	.15	.0068
ADDITIONAL EXPENSES				19,273	8.67	.3837
*** TOTALS ***		14.73		222,314	100.00	4.4265

COSTS BY COURSE LEVEL	COST	PER-CENT	HOURS PRODUCED	PER-CENT	PERCENT TOT HRS	UNIT COST	FTE FACULTY	PER-CENT	PRODUCT. RATIO
(LD) LOWER DIV	140,418	63.16	5,612	80.11	3.86	25.02	7.98	62.25	703.26
(UD) UPPER DIV	64,612	29.06	1,302	18.59	.90	49.63	3.75	29.25	347.20
(GD) GRADUATE	17,284	7.77	91	1.30	.06	189.93	1.09	8.50	83.49
(**) CRSE LVL TOTALS	222,314	100.00	7,005	100.00	4.82	31.74	12.82	100.00	546.41

NOTE: This report was developed by State University of New York-Plattsburgh, using RRPM 1.6 on its campus.

history. The institution itself must answer the questions "How much more should chemistry cost?" and "Is the amount now being spent adequate, too little, or too much?" One cannot begin to answer such questions until compatible data are known and reviewed openly among those involved. Likewise, unit costs at different instruction levels would be expected to vary widely, even within a single discipline. Evaluation of unit costs of instruction in various disciplines requires a great deal of competence and professional integrity. The goals and priorities of the institution must be fully understood by those who will ultimately pass judgment on the appropriateness of the way in which available resources are being distributed to disciplines.

ITER = (01) 1971-72 DATA
BASE = (VD) VALIDATION DATA

UNIVERSITY OF NEW MEXICO
RESOURCE REQUIREMENTS PREDICTION MODEL

11/07/72
1.6-(06) PAGE 22

ORGANIZATIONAL BUDGET

(0021) PSYCHOLOGY DEPARTMENT
(0001) ARTS & SCIENCES COLLEGE

	SALARY RATE	FULL TIME EQUIVALENT	PERCENT	COSTS	PERCENT OF ORGANIZATIONAL BUDGET	PERCENT OF INSTRUCTIONAL BUDGET
CHAIRMAN	23,069	.51		11,765	3.69	.1045
FACULTY (BY RANK)						
(PR) PROFESSOR	20,232	5.79	25.68	117,143	36.70	1.0404
(AP) ASSOC PROFESSOR	13,712	4.27	18.94	58,550	18.34	.5200
(AT) ASST PROFESSOR	11,050	5.92	26.25	65,417	20.49	.5810
(IN) INSTRUCTOR	7,691	.11	.49	846	.27	.0075
(TA) GA AND TA	4,954	6.46	28.65	32,002	10.03	.2842
(**) FACULTY TOTALS	12,149	22.55	100.00	273,958	85.82	2.4331
STAFF (BY CATEGORY)						
(SS) SUPPORT STAFF	5,083	3.59	100.00	18,247	5.72	.1621
(**) STAFF TOTALS	5,083	3.59	100.00	18,247	5.72	.1621
EXPENSES (BY TYPE)						
(EX) EXPENSE				11,098	3.48	.0986
(EQ) EQUIPMENT				3,248	1.02	.0288
(MI) MISCELLANEOUS				898	.28	.0080
(**) EXPENSE TOTALS				15,244	4.78	.1354
ADDITIONAL EXPENSES						
*** TOTALS ***		26.65		319,214	100.00	2.8351

COSTS BY COURSE LEVEL	COST	PER-CENT	HOURS PRODUCED	PER-CENT	PERCENT TOT HRS	UNIT COST	FTE FACULTY	PER-CENT	PRODUCT. RATIO
(LD) LOWER DIVISION	89,872	28.15	8,956	65.92	4.06	10.03	9.05	40.13	989.61
(UD) UPPER DIVISION	82,601	25.88	4,100	30.18	1.86	20.15	5.46	24.21	750.92
(GD) GRADUATE DIV.	146,741	45.97	530	3.90	.24	276.87	8.04	35.65	65.92
(**) CRSE LVL TOTALS	319,214	100.00	13,586	100.00	6.16	23.50	22.55	100.00	602.48

Note: This report was developed by the University of New Mexico, using RRPM 1.6 on its campus.

A third number on the organizational unit report worthy of early attention by administrators is the so-called productivity ratio. The productivity ratio figures define the number of credit hours produced by an average FTE faculty member teaching at each instruction level within the discipline. For example, the lower-division psychology discipline productivity ratio at the University of New Mexico in 1971-72 was 989 to 1. This means that the average full-time faculty member teaching lower-division psychology courses in that institution generated 989 semester credit hours during the academic year. The ratio dropped to 750 at upper-division and 65 at the graduate course level.

Administrators may prefer to think of productivity ratios as an expression of student-teacher ratios in various disciplines. A lower-division FTE student at New Mexico is defined as 30 semester credit hours generated throughout the two semesters of the academic year. Thus, the productivity ratio of 989 to 1 for lower-division psychology at New Mexico is equivalent to a 33.0 to 1 student-teacher ratio (989 ÷ 30 = 33.0).

By far the largest single expenditure in most instructional departments is faculty salaries. The productivity ratio defines the teacher staffing policy of the institution for each department. Thus, examination of variations in productivity ratios from discipline to discipline is an obvious method of initiating analysis of the reasons for unit cost differences among disciplines as well as possible staffing policy adjustments.

ITER = (01) TEST RUN - SHORT P L A T T S B U R G H 10/23/72
BASE = (**) RESOURCE REQUIREMENTS PREDICTION MODEL 1.6-(06) PAGE 76

INSTRUCTIONAL PROGRAM (BY STUDENT LEVEL)		PROGRAM BUDGET: COST PER STUDENT	NUMBER OF STUDENTS	PERCENT PROGRAM STUDENTS	PERCENT TOTAL STUDENTS	COST PER STUDENT: PROGRAM COST	PERCENT PROGRAM BUDGET	PERCENT INSTR BUDGET
(0021)	ECONOMICS							
(LD)	UG LOW DIV	740.56	22.00	41.51	.45	16,424.32	35.05	.33
(UD)	UG UP DIV	981.75	31.00	58.49	.63	30,434.25	64.95	.61
(**)	WTD. AVG./TOTALS	884.12	53.00	100.00	1.08	46,858.57	100.00	.93
(0022)	HISTORY							
(LD)	UG LOW DIV	900.13	39.00	42.94	.79	35,107.02	36.78	.70
(UD)	UG UP DIV	1,070.69	47.00	50.54	.96	50,322.43	52.72	1.00
(GD)	GRADUATE	1,430.65	7.00	7.53	.14	10,014.55	10.49	.20
(**)	WTD. AVG./TOTALS	1,026.28	93.00	100.00	1.89	95,444.00	100.00	1.90
(0023)	POLY SCI							
(LD)	UG LOW DIV	787.74	64.00	52.46	1.30	50,415.36	45.70	1.00
(UD)	UG UP DIV	1,032.72	58.00	47.54	1.18	59,897.76	54.30	1.19
(**)	WTD. AVG./TOTALS	904.21	122.00	100.00	2.48	110,313.12	100.00	2.20
(0024)	CHEMISTRY							
(LD)	UG LOW DIV	965.43	42.00	51.85	.85	40,548.06	39.19	.81
(UD)	UG UP DIV	1,497.23	37.00	45.68	.75	55,397.51	53.55	1.10
(GD)	GRADUATE	3,756.69	2.00	2.47	.04	7,513.38	7.26	.15
(**)	WTD. AVG./TOTALS	1,277.27	81.00	100.00	1.65	103,458.95	100.00	2.06
(0025)	GEOLOGY							
(LD)	UG LOW DIV	1,294.94	16.00	53.33	.33	20,719.04	39.76	.41
(UD)	UG UP DIV	2,242.64	14.00	46.67	.23	31,396.96	60.24	.63
(**)	WTD. AVG./TOTALS	1,737.[illegible]	30.00	100.00	.61	52,116.00	100.00	1.04
(0026)	PHYSICS							
(LD)	UG LOW DIV	1,474.97	22.00	81.48	.45	32,449.34	62.49	.65
(UD)	UG UP DIV	3,895.20	5.00	18.52	.10	19,476.00	37.51	.39
(**)	WTD. AVG./TOTALS	1,923.16	27.00	100.00	.55	51,925.34	100.00	1.03
(0027)	MATH							
(LD)	UG LOW DIV	790.34	57.00	41.91	1.16	45,533.88	35.64	.91
(UD)	UG UP DIV	1,041.04	79.00	58.09	1.61	82,242.16	64.36	1.64
(**)	WTD. AVG./TOTALS	[illegible]	136.00	100.00	2.77	127,776.04	100.00	2.54

NOTE: This report was developed by State University of New York-Plattsburgh, using RRPM 1.6 on its campus.

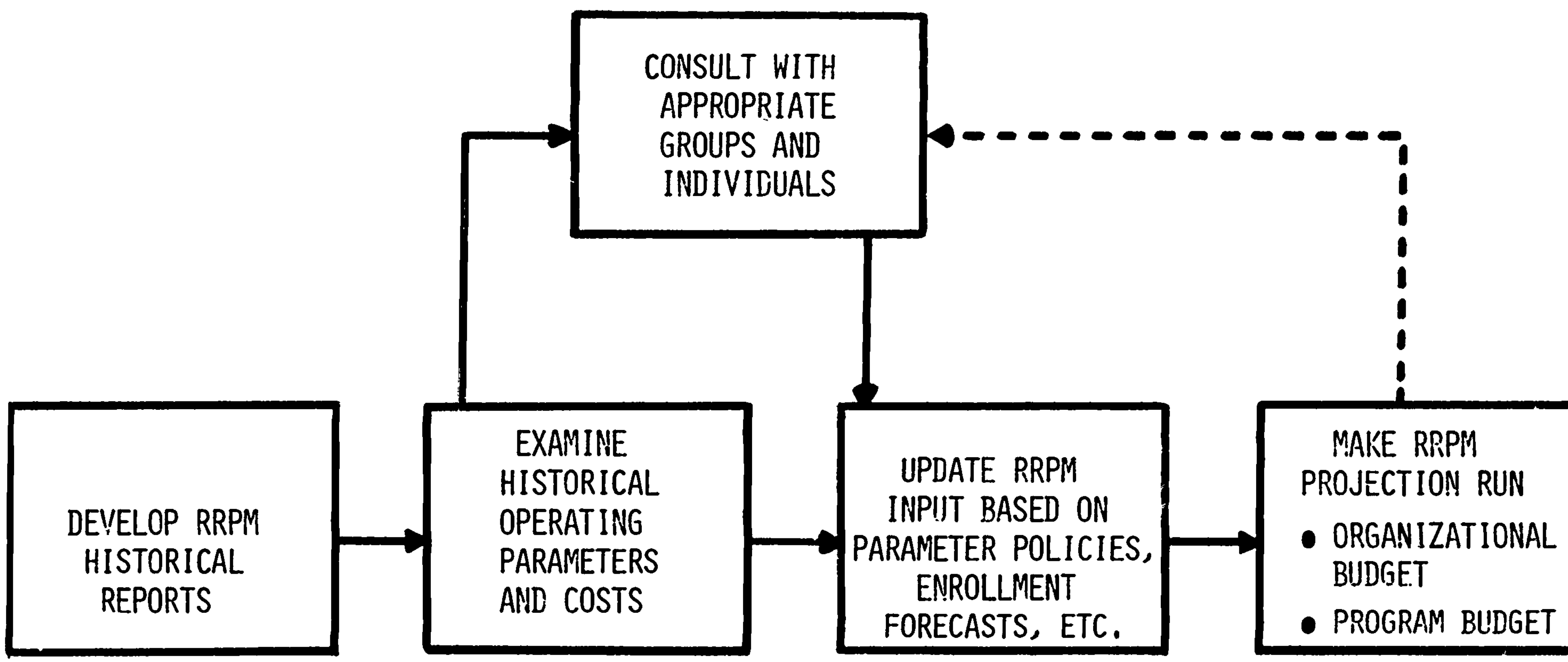
PROGRAM BUDGET REPORT

Another report forthcoming from the RRPM system is a program budget report. This report sorts and reaggregates expenditure data into a program budget format so that dollar expenditures are attached to specific instructional programs rather than such organizational units as departments or disciplines. Thus, the program budget report displays the amount of expenditures consumed by each of the instructional programs of the institution.

The key figures on the program budget report are the cost per student (annual cost per major) and the number of FTE students enrolled at each level of each degree or certificate program. The cost per student is the unit cost for degree programs and allows comparisons among degree program costs. The cost per student is calculated by dividing the total cost of the program by the number of students in the program.

Many educators feel that cost per student is the most meaningful figure for display to state funding agencies and that those responsible for allocating funds to the educational enterprise should be concerned more with the cost of educating students in various fields of study than with the ways in which dollars have been allocated among departments within the institutions. Academic freedom and the ability to manage the educational process are dependent upon giving administrators sufficient latitude to make choices on how resources are distributed internally. So long as the resulting annual cost per major in each field of study remains reasonable, many educators feel, variations in dollar allocations among departments can be left to the judgment of postsecondary education managers within the institution.

RRPM AS A STRUCTURE FOR PLANNING AND BUDGETING



RRPM AS A STRUCTURE FOR PLANNING AND BUDGETING

After examining and evaluating the current status of resource utilization within the institution, users confront the demanding task of using the RRPM system for planning future operations. Up to this point, the RRPM system has been considered only as a level two management information system, and its implementation has been primarily a technical task. Successful implementation at this second level of information systems application could be accomplished by carefully following prescribed rules and studiously avoiding data errors. If users are to gain the full utility of the RRPM system, they must now move to the third level of application -- using the model as a planning and management system tool.

With full understanding of the status quo operating parameters throughout the institution, the campus planners must now consult and deliberate about possible changes in the operating parameters. Many constraints will restrict the available choices. Faculty on tenure cannot be modeled out of existence, nor can salary schedules that are negotiated with faculty unions or budget limitations that are imposed by state legislatures be disregarded. Separate analysis will probably need to be conducted in order to forecast enrollments in various programs at various student levels. If a variety of opinions and philosophical views dictate several possible approaches to future operation, many different sets of input will need to be devised and evaluated through runs of the model.

Zeroing in on a plan that is acceptable to the broadest possible cross-section of constituents will require an iterative process. After many runs and reruns, the RRPM projections will be useful to the institution for developing its budget formats. The organizational budget reports will assist in developing the kinds of detailed line-item organizational unit allocations necessary for internal management and stewardship responsibilities. The program budget will be primarily useful for presentation to funding agencies that are demanding a quick way of determining how many educated students in what areas they are getting for the resources they are allocating to higher education. Of course, it is always desirable to couple additional information about the institution and its programs with the budgetary figures in order to facilitate better understanding of the nature of the resource request.

SPECIFIC PLANNING DECISIONS

1. PER DISCIPLINE LEVEL
   - FACULTY PRODUCTIVITY RATIOS
   - FACULTY RANK MIX

2. PER DISCIPLINE
   - CHAIRMAN ASSIGNMENTS
   - SUPPORT STAFFING RATIOS
   - SALARY AND WAGE SCHEDULES
   - OTHER DIRECT EXPENSE FORMULAS

3. PER PROGRAM LEVEL
   - ENROLLMENTS
   - COURSE REQUIREMENTS

4. PER NONINSTRUCTIONAL COST CENTER
   - BUDGETING FORMULAS

SPECIFIC PLANNING DECISIONS

It is frequently difficult for administrators who are unfamiliar with planning and management systems capabilities to attack the problem of using such systems efficiently during the planning and budgeting process. It therefore seems important to identify a specific list of key decisions that must be considered in developing any set of projection run inputs for the RRPM system. This list of key planning considerations may be divided into four groups.

The first set of specific planning decisions relates to each instructional discipline at each course or instruction level. These input decisions include the faculty productivity ratios and the faculty rank mix. For example, it might be determined from the historical reports that the biology department is producing 744 lower-division credit hours for every FTE faculty teaching lower-division courses. Further, it might be known that the rank mix of these lower-division instructional faculty is 60 percent assistant professors and 40 percent associate professors. Perhaps the institutional planners will accept this historical situation as desirable and will deem it appropriate to keep the status quo. In that case no change to the input from the historical data base would be made. On the other hand, an administrator might wish to know the resource implications of allocating positions to the biology department for lower-division instruction on the basis of a productivity ratio of 500 credit hours to one FTE faculty position. He also might wish to determine the consequences of replacing an associate professor vacancy in lower-division biology with an instructor or some other faculty

rank. These kinds of basic questions require alterations to the historical data base for the RRPM system. Examining the operating parameters of each department and discipline of the institution is a demanding task but one that may result ultimately in a well-developed plan for future operation.

For each discipline or department a second category of inputs involves a description of the chairman's assignment, the number of support staff who will be available, the salary and wage schedules that will be applied, and the direct expense formulas that will be used to allocate additional resources to the department. Again, the status quo may be perpetuated, or variations in specific departments with regard to specific parameters may be tried. Decisions to stay with the status quo parameters require no input to the model. Only changes to the historical data need be written down and used as update inputs for the RRPM projection runs.

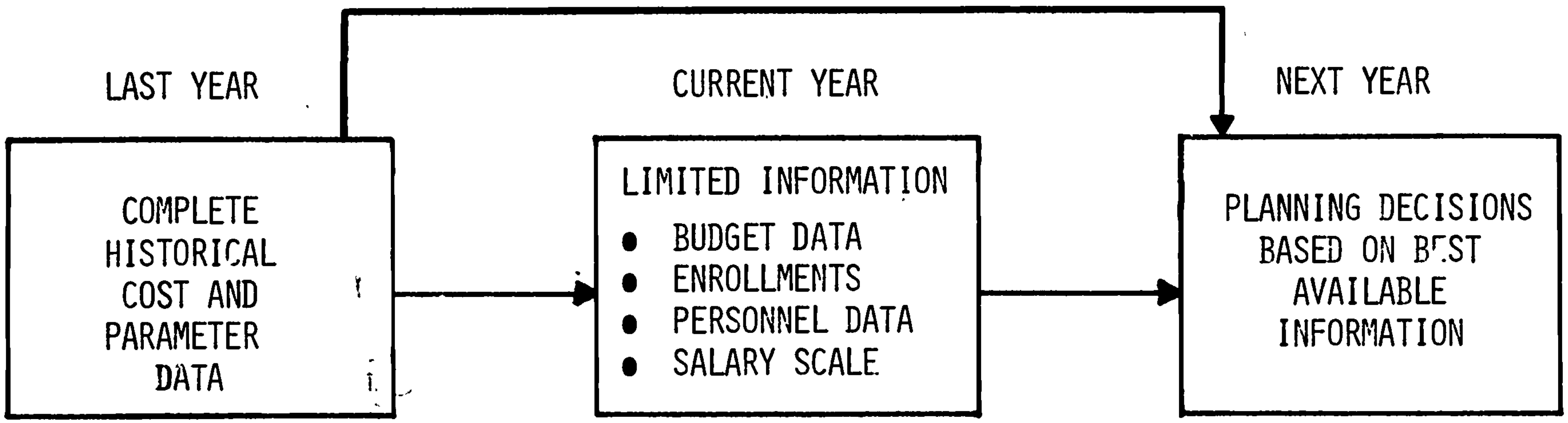
Another type of planning consideration pertains to the enrollments that are likely to occur in each of the instructional programs of the institution. If 300 FTE students are currently enrolled in the biology baccalaureate degree program at the lower-division level and 200 are enrolled in the biology program at the upper-division level, what is the number likely to be next year? An analysis of student flows and/or some policy on admissions ceilings will have to be made in order to forecast accurately program enrollments to be used as RRPM projected run input. Many institutions are looking forward to the use of tools such as the NCHEMS Student Flow Model, now being developed, as possible aids in gaining this important planning information.

A final category of planning decisions for use in the RRPM system is related to budgeting formulas for noninstructional cost centers. If the library is budgeted for $1.5 million for this year, what will its request be next year? If student personnel services are budgeted for $700,000 this year, what will their budget request be for next year? Some states have funding formulas that can be readily input to the RRPM system, while others leave the mechanisms for developing budget requests in these noninstructional areas solely to the institution. Typically, state funding formulas in such areas as library and student personnel services state that dollars will be appropriated on the basis of credit hours produced, FTE students enrolled, or a percentage of the instructional budget. Until a much better understanding of the relationship between the instructional and noninstructional areas of the institution is available, it will be difficult for any single institution to contrive its own budgeting formulas in these areas in a manner that will allow it to argue for the validity of the formula.

Normally, only a small number of specific planning decisions will provide the data input for a specific RRPM projection run. Administrators will frequently wish to know the resource implications of specific decisions or sets of decisions in isolation from other influences. If a large number of changes are made simultaneously, it becomes extremely difficult to sort out the impact of individual decisions.

During the planning process it is extremely important that competent computer services be provided and that quick turnaround (hopefully, one day) be afforded for RRPM projection runs. If decision makers are to develop a feeling that RRPM is a tool that may be used repeatedly in a convenient manner, they must be able to spell out alternative sets of planning decisions quickly and receive feedback in the form of RRPM reports while planning decisions are still fresh in their minds. If the RRPM system is used merely as a one-time computational tool to translate a single set of arbitrarily determined decisions into a budget, the model cannot fulfill its potential and may well contribute to hardening the current institutional mold. Like any tool, RRPM may be used wisely or indiscreetly. People manage institutions, and the model can perform no better or worse service than people's capabilities and motives allow.

THE TIME-LAG PROBLEM



THE TIME-LAG PROBLEM IN PLANNING

Those engaged in the institutional planning process will frequently be confronted with a time-lag problem. Specifically, this means that each year the institution has the responsibility of planning and budgeting early in the academic period for the next academic year's activities. However, during each current year only incomplete knowledge of the current state of affairs and the current operating parameters of the various departments and disciplines is available. Even if RRPM has been used in a historical sense, the only accurate and relatively complete operating parameter and resource utilization data will be those related to the year prior to the current year. Thus, many planning decisions for the future must necessarily be based on year-old data. This forces the institution to be constantly looking ahead at least two years for many decisions. In reality, a combination of the cost study results from a historical RRPM run for the last year and a limited set of information about the current year will provide the basis for laying plans for the next budgetary period. This situation appears to be one of the inconveniences with which higher education must cope, because basic alterations in the mode of operation can be implemented only at the beginning of a new budgetary period rather than whenever new information dictates changes, as is the case in most business operations.

NEEDED: OUTCOME ASSESSMENT DATA
TO AUGMENT COST DATA

EXAMPLES:

PER DISCIPLINE -- STUDENT EVALUATIONS

PER PROGRAM -- STUDENT EVALUATIONS AND
STUDENT FOLLOW-UP

OUTCOME ASSESSMENT DATA

Users of the RRPM system will soon realize that cost information is simply not enough. The most sophisticated financial analysis tools will tell us the cost of everything but the value of nothing. A problem for institutional planners is the difficulty of knowing when the outcomes of an activity or program are worth the expenditure of resources. If we can determine that a program or activity is producing at a high quality level, we will frequently be willing to pay a high price for that outcome. How can we choose among competing sets of programs and activities without knowing the relative quality or value of the competitive activities? It is quite apparent that planners need information about outcome assessment that will augment the cost data related to various activities and programs. At best, such augmentation data are extremely difficult to compile.

Many institutions are dealing with the student more and more as a client, and they are concerned about student satisfaction and evaluation of educational experiences. Student evaluation of courses and degree programs is only one small piece of evaluation data that may be used to augment cost data. Many schools have also become concerned with the relative success of their graduates and have conducted follow-up studies. Community colleges have been especially active in following vocational students into the business world and following their transfer students through state colleges and universities in order to evaluate their degree of success. The Carnegie Commission has categorized some institutions as having exceptional quality

on the basis of the percentage of their baccalaureate graduates who go on to receive graduate degrees from prestigious institutions. So there has been at least a small beginning, a precedent, for using student evaluations and investigations of student postgraduate success as a means of evaluating the outcomes of educational activities and programs.

Obviously, the wise administrator will approach the entire area of outcome assessment with great care and full understanding that the best efforts at first must necessarily be only feeble imitations of what is desirable. However, the great need for balancing cost information with outcome assessment information is leading more and more schools into serious evaluation exercises. All institutions seek the goal of better educational decision making. Cost information can contribute its share to the accomplishment of that goal, and with the exercise of professional prudence, the evaluation and assessment of outcomes can likewise be useful.

TWO APPROACHES TO EFFICIENCY:

(1) HOLD UNIT COST CONSTANT AND INCREASE QUALITY

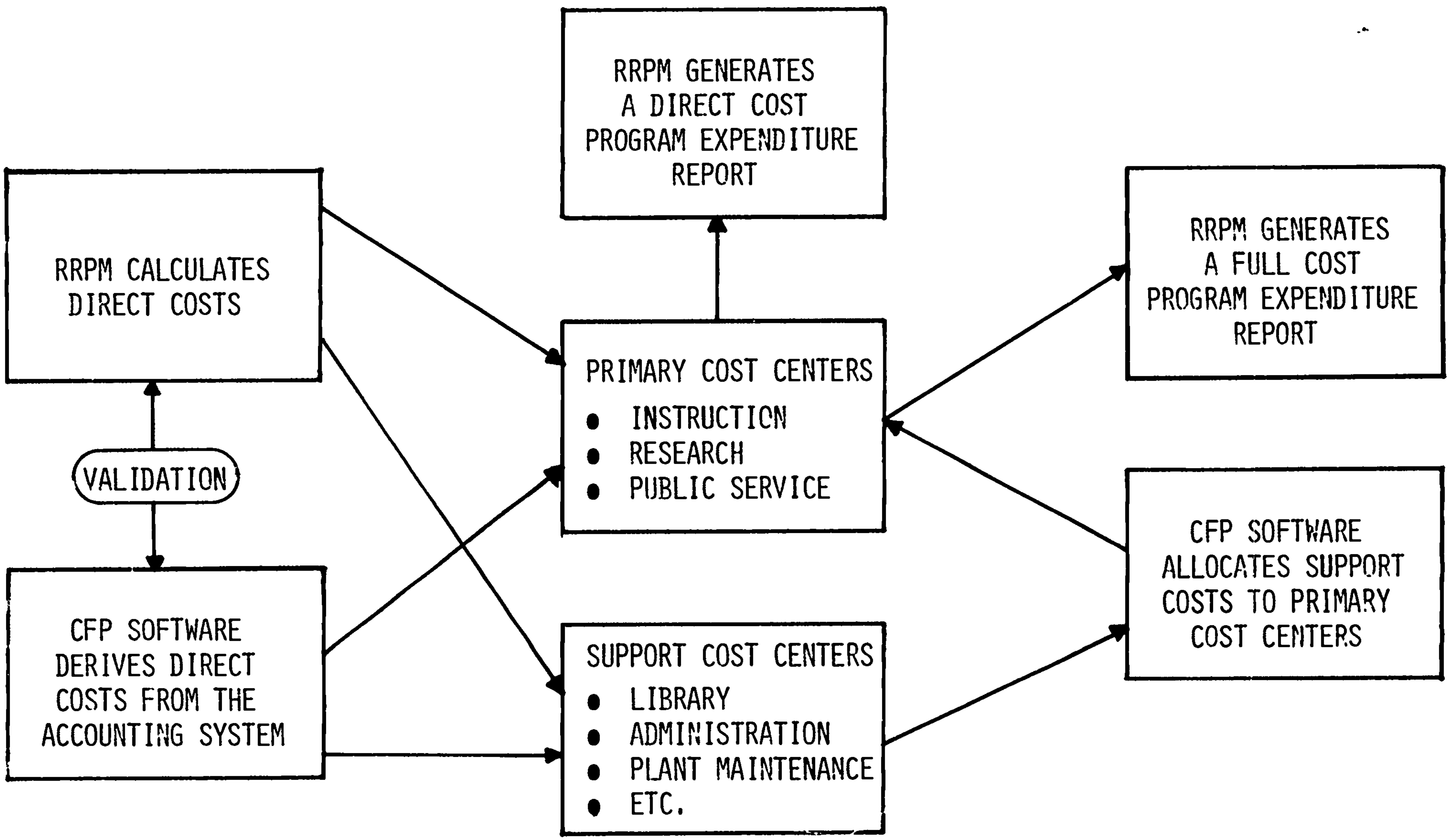
(2) HOLD QUALITY CONSTANT AND DECREASE UNIT COST

THE SEARCH FOR EFFICIENCY

There are two basic approaches to obtaining greater efficiency in the educational enterprise. One approach is to hold the unit cost of instruction constant and simultaneously increase the quality of the outcome. The alternative approach is to hold the quality constant and simultaneously decrease the unit cost. Obviously these two approaches are not mutually exclusive.

As campus planners make discrete decisions related to productivity ratios, alternative modes of instruction, allocation of expenses for instructional supplies, and the recruitment of specific ranks and types of faculty, they will surely be confronted with the question, "What effect will this decision have on the quality of instruction?" No one knows how far class size or faculty credit hour productivity can be pushed without impairing instructional quality. Indeed, if we continue to operate our institutions without any reliable or consistent efforts to assess outcomes, we will never be able to know when we have pushed some of the departmental parameters beyond acceptable limits. While the RRPM system cannot fully answer these important questions that weigh so heavily on college and university administrators, it is one useful tool for the purpose. Many other tools are needed.

RELATIONSHIP OF COST FINDING PRINCIPLES SOFTWARE TO RRPM 1.6



RELATIONSHIP OF CFP SOFTWARE AND RRPM 1.6

The RRPM system and the Cost Finding Principles software system, both produced by NCHEMS, complement each other in many ways. Both RRPM and the Cost Finding Principles software can be used to determine the direct expenditures associated with both primary cost centers and support cost centers. The method for determining the expenditures is somewhat different in each system, however.

RRPM calcualtes the direct costs of instructional activities by counting the number of faculty, multiplying those faculty by salary schedules appropriate for their ranks, and adding in support staff and operating expenses on the basis of defined formulas. The output reports of the RRPM system can be no more accurate than the input data and the expense formulas that were given to the model.

The Cost Finding Principles software, on the other hand, derives the direct expenditures for each cost center directly from the accounting system and can be no more accurate than the accounting system itself. If funds from one account are used for activities associated with another account without internal transfers having been made, the results of the Cost Finding Principles software run will prove inaccurate.

In reality, neither the RRPM system nor the Cost Finding Principles software provides any guarantee of accuracy in determining the actual direct expenditures for primary and support cost centers. Both can be checked for accuracy against the total expenditures of the institution and against expenditures for various organizational units within the institution. However, even matching the total expenditures does not guarantee accuracy for all cost centers within the organization. That is, the sum of the parts may equal the whole, but the parts themselves may contain gross inaccuracies that only balance one another in the total expenditure figure.

Running both the RRPM system and the Cost Finding Principles software independently using an identical set of conventions and definitions is useful in conducting a direct cost study in an institution. The independent runs can then be checked against one another, cost center by cost center. This validation process will reveal discrepancies and lead to analysis of which system has produced the most accurate results. The validation process is an exacting chore, but one that is extremely revealing and educational for institutional managers.

In addition to generating the direct costs for primary cost centers, RRPM will also produce a record of historical expenditures in a program format. The Cost Finding Principles software does not have the capability of translating expenditure data into a program format.

After the direct costs of primary and support cost centers have been determined by either the RRPM or Cost Finding Principles systems, the Cost Finding Principles software may be used to allocate the support costs across the primary cost centers. For example, the Cost Finding Principles software can be used to allocate library expenditures across the instructional disciplines on the basis of a variety of parameters ranging from credit hours to FTE faculty to direct expenditures of the disciplines. If all support costs are allocated across the primary cost centers of an institution, the Cost Finding Principles software will report the full cost (including both direct and support costs) of each primary cost center. For example, the direct cost of lower-division biology instruction may be $250,000. But after a portion of the library, the administrative expenses, the physical plant maintenance and operation, etc., have been allocated to that cost center, the full cost of lower-division instruction in biology may be near $500,000.

After the Cost Finding Principles software has been used to determine the full cost of the primary activity cost centers, the RRPM system may again come into play and be used to translate the full cost data into a program expenditure report. Thus, a full costing capability that will provide information on expenditures related to both activities (disciplines) and programs of an institution requires the coupling of the Cost Finding Principles software and RRPM capabilities. This is a rather sophisticated application which requires some institutional experience with both systems and a full understanding of the conceptual cost study framework that is being employed.

CONCLUSION

RRPM 1.6 is a versatile system. The initial implementation approach described in this document should certainly provide sufficient information to assist in the planning and budgeting process. The information contained in the first validated runs using historical data is sufficient by itself to keep campus planners at work for a long time. By the time institutional decision makers begin to feel that they have employed initial report information to the limits of its usefulness, the campus personnel will undoubtedly have educated themselves sufficiently to be able to reach out for a higher level of planning and management systems sophistication, one whose capabilities have been sketched in this document.

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